

## **EGS CONFIDENCE TEST EXECUTION COVER SHEET**

1. Test ID and Title: EOC4 - Telemetry Analysis Confidence Test
2. Test Conductor / Test Lead Diane Womack
3. Planned Execution Date: 12-20-96 to 12-24-96
4. Actual Execution Date: \_\_\_\_\_
5. Planned Configuration:
  - SAS workstation at the EOC (display, host-attached printer, ftp, Kerberos)
  - EOC workstations (ftp, Kerberos)
  - Servers: Data Server, Real-time Server, Multicast Server
  - Data Storage Unit (File Servers, RAID Units)
  - Printers: Color, Laser, Line
  - FOS Analysis Subsystem
  - FOS Telemetry Subsystem
  - FOS Real Time Contact Management Subsystem
  - FOS User Interface Subsystem
  - FOS Planning and Scheduling Subsystem
  - FOS Data Management Subsystem
  - FOS Resource Management System
6. “As Run” Configuration:
7. Package items planned for execution:

Test Set-Up steps: 1, 11-16, 18  
Test Case EOC4.4 steps: All  
Test Case EOC4.8 steps: All  
Test Termination steps: 1-7,12
8. Package items actually executed and deviations from currently published procedures.
9. Results
  - a. Capabilities successfully demonstrated

- b. Capabilities not successfully demonstrated
  - c. Requirements verified
  - d. Discrepancy Reports submitted
10. Lessons Learned

## **Telemetry Analysis Confidence Test - EOC4**

The Spacecraft (S/C) Analysis Service provides the capabilities needed for management of the on-board systems and for overall mission monitoring. It allows the EOC operators to monitor and manage the S/C system configurations and resources; perform real-time (R/T) and off-line analyses of S/C bus and instrument data to track performance and trends, and detect and isolate anomalies. These analysis functions are provided on a non-interference basis with R/T telemetry processing functions. Only a subset of the analysis functions is provided in real time through the use of a FOS User Interface (FUI) Quick Analysis and SSR Analysis tools.

The Analysis Service evaluates the performance of the S/C subsystems and the status of instruments. Performance data are processed from spacecraft recorder and R/T housekeeping, and historical telemetry. The historical telemetry is retrieved from either short-term (FOS DMS) or long-term storage (SDPS). The EOC reports on the quality of the data used for the analysis, reports failures detected, and identifies marginal system operation. The EOC enables operators to analyze the performance of the power, command and data handling, thermal, communications, and guidance navigation and control subsystems.

### **Test Objectives:**

The objectives of the test are:

- Verify that the EOC can receive, process, and analyze S/C bus and instrument data to track performance and trends, and detect and isolate anomalies in real-time (R/T) or off-line.
- Verify that system statistics (analog, discrete, and limit) are automatically generated at the EOC for telemetry parameters on daily, monthly, orbital, and mission-to-date time spans.
- Verify that user-defined statistics (min-max-mean and standard deviation) for a specified time interval can be generated for a selected set of telemetry parameters.
- Verify that the following types of requests can be performed: Quick Analysis, Replays, and Standing Orders.
- Verify that the EOC can perform S/C Clock correlations to Coordinated Universal Time (UTC) and detect faults of Solid-State Recorder (SSR) playbacks.
- Verify that the EOC can apply algorithms to S/C telemetry during off-line analysis.
- Verify that carry-out files can be generated by the FOS Analysis Subsystem to contain the following: AM-1 S/C housekeeping data, AM-1 S/C health and safety data, and AM-1 diagnostic data, Network Control Center (NCC) operator data message (ODM) data, and EDOS Customer Operations and Data Accounting (CODA) message data.
- Verify that S/C Analysis System (SAS) can receive carry-out files, SSR trash buffer files, and standard analysis products for specialized mission analyses which are not supported by the FOS Analysis Subsystem.
- Verify the storage and retrieval of carry-out files and other analysis products from the local EOC archive (short-term storage) and the GSFC DAAC (long-term storage).

- Verify that the analysis products can be provided in both hardcopy and softcopy form.

Test Configuration:

Hardware and software configurations at each ECS site are managed and tracked by the M&O organization at that site. The configuration that is tested against will be provided in the test report.

(See Exhibit EOC4-1.1, EOC4-1.2, and EOC4-1.3)

Participants and Support Requirements:

Participants:

FOT, SN (TDRSS), S/C Integration Facility, Sustaining Engineering Facility,  
Valley Forge (M&O personnel), Western Test Range (M&O personnel),  
RFSOC (M&O personnel), FDF (M&O personnel), NCC (M&O personnel)

Communications:

Voice - SCAMA and CCL circuits    **TBS**  
Data - EBnet  
IP addresses:    **TBS**

Equipment and Software:

SAS workstation at the EOC (display, host-attached printer, ftp, Kerberos),  
EOC workstations (ftp, Kerberos)  
Servers: Data Server, Real-time Server, Multicast Server  
Data Storage Unit (File Servers, RAID Units)  
Printers: Color, Laser, Line  
FOS Analysis Subsystem  
FOS Telemetry Subsystem  
FOS Real Time Contact Management Subsystem  
FOS User Interface Subsystem  
FOS Planning and Scheduling Subsystem  
FOS Data Management Subsystem  
FOS Resource Management System

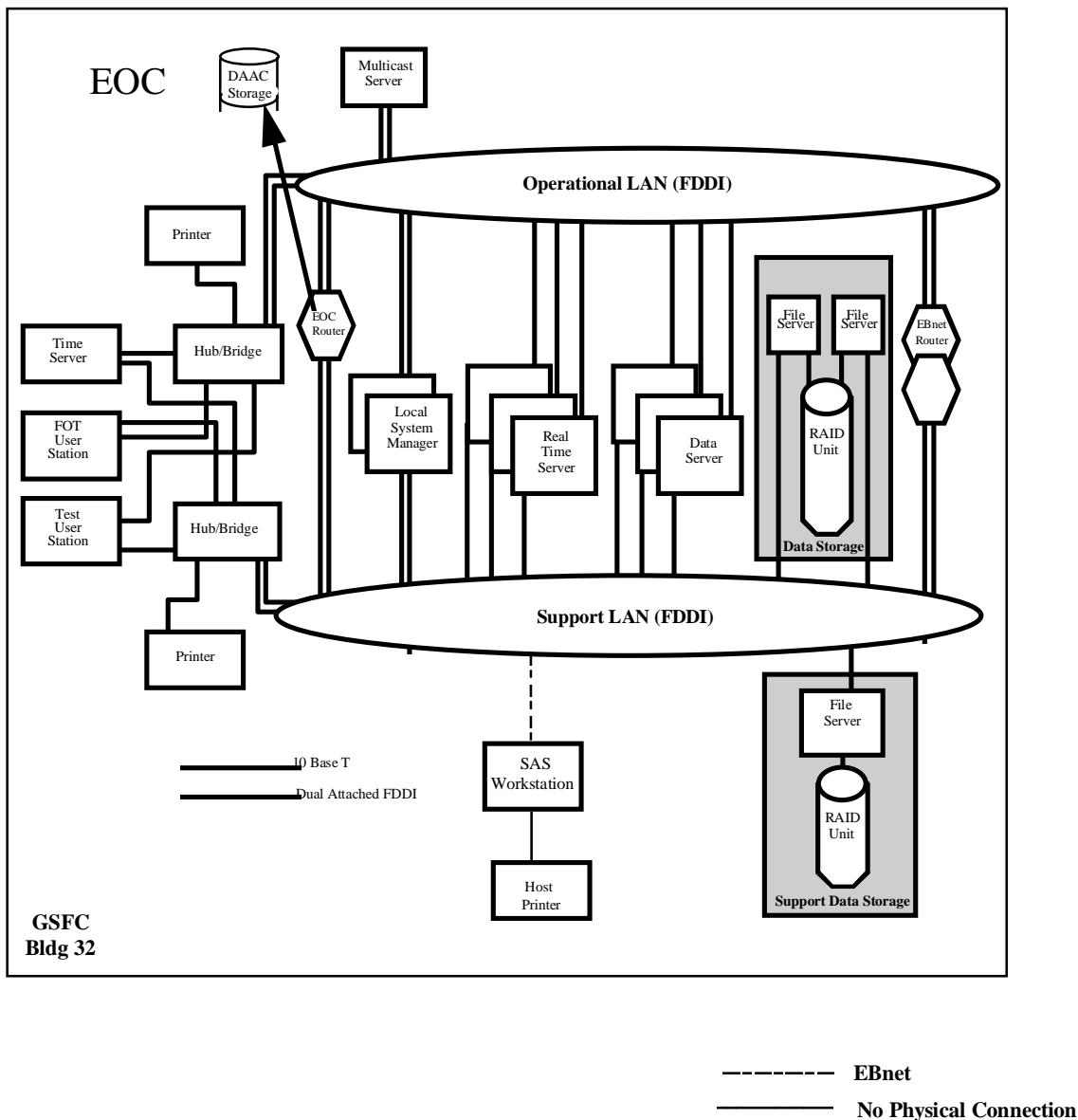
Test Tools:

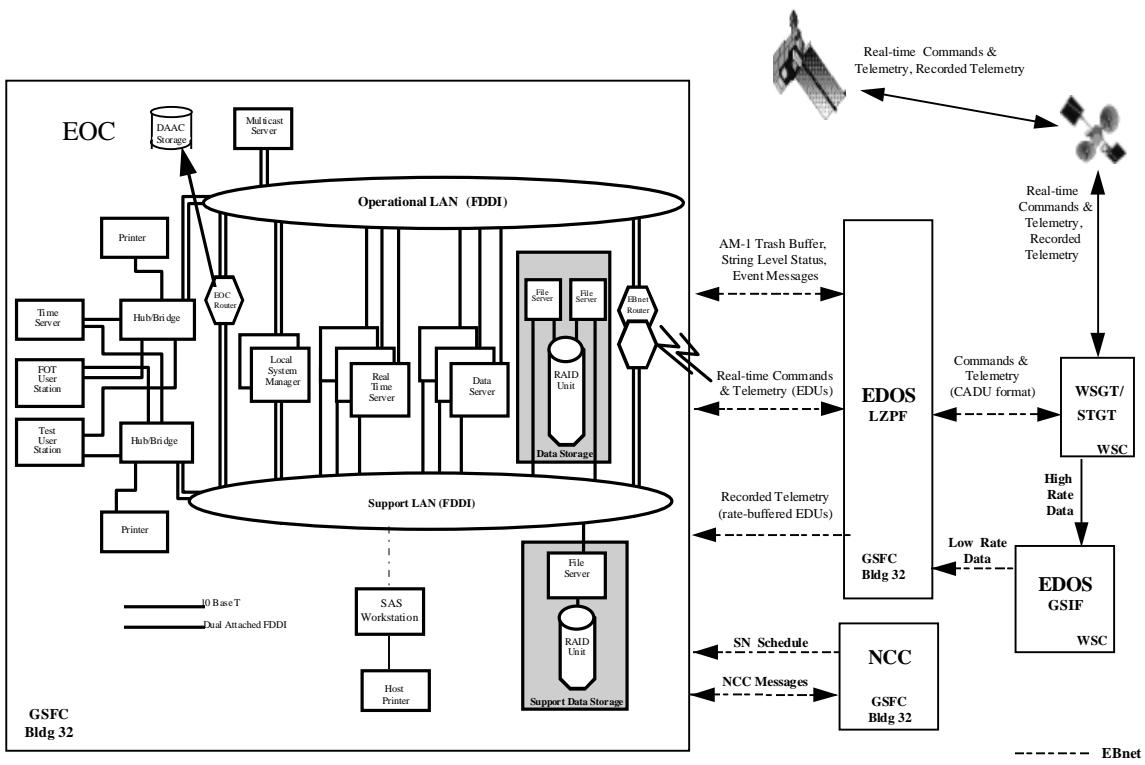
1. **ETS MPS** (S/C simulation mode) - sends telemetry in CADU format to the EDOS.
2. **ETS HRS** - provides high-rate telemetry (150 Mbps) in CADU format to EDOS or to the ETS MPS via a H/K file.
3. **SSIM** - simulates the AM-1 S/C and provides telemetry in CADU format to the EDOS.

Test Prerequisites:

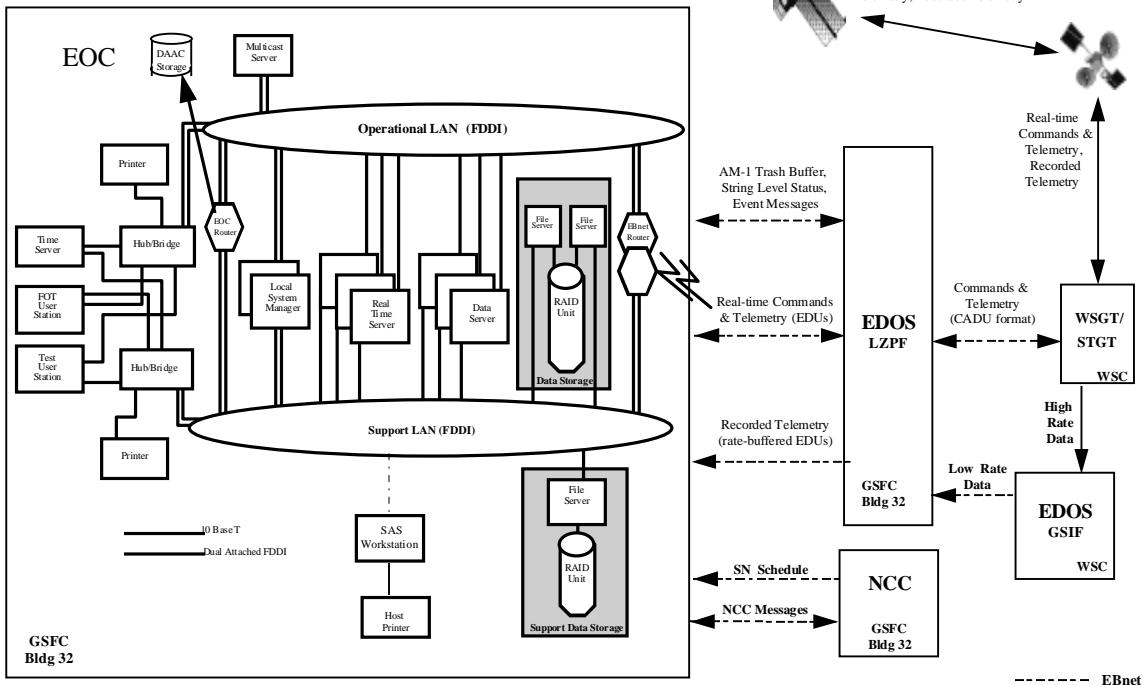
Dynamic pages containing alphanumerics, tables, graphs, and “NODATA” and “STATIC” flag indicators (use the Display Builder); rooms (use the Room Builder);

event messages (use the Quick Message Generator); and report templates (use the Report Selector: On Demand, Periodic, and Custom dialogs); tables containing predetermined telemetry parameter values to be compared with resulting decommutated and EU converted values; and ETS scenario script files.





**EXHIBIT EOC4-1.2: Telemetry Analysis using RFSOC & ETS MPS**



**EXHIBIT EOC4-1.3: Telemetry Analysis using TDRSS and AM-1 S/C**

Test Data:

Description / Characteristics	Source	File/script name and physical location
<p>AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters):</p> <ul style="list-style-type: none"> <li>• S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1)</li> </ul>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>rt_hk.scn</b>
<p>AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters):</p> <ul style="list-style-type: none"> <li>• S/C bus and instrument H&amp;S telemetry data (1 kbps, APID = 2, VCID = 2)</li> </ul>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>hs_standby.scn</b>
<p>CTIU standby telemetry in the form of EDUs (1 kbps [all telemetry sources except SSIM], APID = 5, VCID = 2) - one of each TLM value bit size - 1, 8, 16, 32, 48; representative set.</p>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>hs_standby.scn</b>
<p>AM-1 recorded data in CCSDS telemetry packets in the form of recorded EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48) in rate-buffered data files (each file limited to a single APID type,):</p> <ul style="list-style-type: none"> <li>• S/C bus and instrument H/K telemetry data (256 kbps, APID = 1, VCID = 1; 150 Mbps [ETS HRS and AM-1 S/C only], APID = 1, VCID = 11)</li> </ul>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>playback.scn</b>
<p>AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48):</p> <ul style="list-style-type: none"> <li>• S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1) with red &amp; yellow high/low, and delta limit violations</li> <li>• S/C bus H&amp;S telemetry data (1 kbps, APID = 2, VCID = 2) with red &amp; yellow high/low, and delta limit violations</li> </ul>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>limitchk.scn</b>
<p>AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each telemetry sample type - current, voltage, temperature, power; one of each of the telemetry point source type - real or raw data, flight software generated data, pseudo or</p>	<p>ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS</p> <p><b>EOC1 Test Data</b></p>	<b>euconv.scn</b>

Description / Characteristics	Source	File/script name and physical location
derived data, passive analog, and active analog; one of each possible APID/VCID combination; one of each EU conversion type - line segment [up to 15 line segments - 1, 2, 5, 8, 11, 14, 15]; polynomial [1st, 2nd, 3rd, 4th, 5th, 6th, and 7th order]; exponential.		
Dynamically modeled telemetry parameters.	ETS, FOS DMS  <b>EOC1 Test Data</b>	<b>model.scn</b>
AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each possible APID/VCID combination)	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS  <b>EOC1 Test Data</b>	<b>TBS-5</b> context.scn [Release B]
AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each possible APID/VCID combination)	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS  <b>EOC1 Test Data</b>	<b>TBS-6</b> derived.scn [Release B]
SCC memory dump data in the form of EDUs (1 kbps [all telemetry sources except SSIM], APID = 6, VCID = 3; 16 kbps, APID = 3, VCID = 3)	ETS, SSIM, AM-1 S/C, FOS DMS or SDPS via the <b>EOC2 test</b>	<b>TBS-3</b> [Release B]
CTIU memory dump data in the form of EDUs (1 kbps [all telemetry sources except SSIM], APID = 6, VCID = 3; 16 kbps, APID = 3, VCID = 3)	ETS, SSIM, AM-1 S/C, FOS DMS or SDPS via the <b>EOC2 test</b>	<b>TBS-3</b> [Release B]
instrument memory dump data in the form of EDUs for ASTER, CERES, MODIS, MISR, and MOPITT (1 kbps, APID = 6, VCID = 3; 16 kbps, APID = 3, VCID = 3)	AM-1 IOT, FOS DMS or SDPS via the <b>EOC2 test</b>	<b>TBS-3</b> [Release B]
EDOS Customer Operations Data and Accounting (CODA) message data	<b>EOC1 Test Data</b> via the FOS DMS, ETS OMDSIM, or EDOS	<b>TBS</b> [Release B]
Network Control Center (NCC) ODM data	<b>ICT9 Test</b> or NCC	<b>TBS</b> [Release B]
Pre-defined user algorithms that modify telemetry parameters (C or C++)	AM-1 FOT and/or IOT	<b>TBS</b> [Release B]

### Test Case Descriptions:

The initial telemetry analysis tests will begin with the EOC and the FOS DMS as the telemetry source. For initial Release B testing, the ETS (MPS and HRS) or the SSIM will be the telemetry sources; these tests will be conducted using the S/C at Valley Forge (VF) and/or Western Test Range (WTR). If the S/C and the SN are not integrated, the Radio Frequency Simulation Operations Center (RFSOC) along with ETS MPS will be used simulate the S/C. The rooftop antenna at VF is also an option. The FDF will be used to provide pointers for the rooftop antennas.

## **EOC4.1 Quick Analysis**

### **R/T Analysis is a Release B capability. [24]**

Requirements to be Verified:

**Release A:** EOC-6010#A\* - (1)

**Release B:** EOC-6010#B, EOC-6070#B, EOC-6130#B, EOC-6135#B,  
EOC-6140#B, EOC-6195#B, EOC-6200#B, EOC-6210#B - (8)

This test verifies that the EOC can perform real-time (R/T) telemetry analyses to track performance and trends, and detect and isolate anomalies.

EOC is configured for R/T telemetry analysis. A R/T logical string is initialized on a R/T server. A mirrored or tailored connection is established. A set of dynamic display pages are created through the selection of telemetry parameter selections using the FUI Quick Analysis tool. The display pages provide updating displays of R/T time telemetry data in several output views: Each type of output view (graph, table, info window and/or alphanumeric window) will be exercised. The format option will also be used to customize each type of output view.

## **EOC4.2 Telemetry Replays**

### **Dedicated and shared replays and analysis request monitoring are Release B capabilities. [24]**

Requirements to be Verified:

**Release B:** EOC-5240#B, EOC-6010#B, EOC-6100#B, EOC-7120#B

This test verifies that the EOC can perform dedicated and shared replays to assist in the analysis of historical telemetry data to track performance and trends, and detect and isolate anomalies.

The replay function is performed through the Replay Controller tool. The following specifications are entered or selected in the Replay Controller window: parameters for the logical string (e.g., S/C and ODB identifiers, data type, replay type, and replay rate); and the time frame (start and stop times) of the requested telemetry data. The request is submitted. A telemetry data request is sent to the FOS DMS (short-term archive) or the data server for the SDPS (long-term archive). The telemetry is retrieved, decommutated, and EU converted. The replay logical string(s) are specified, then requested. The request is accepted if all the required resources are available and no errors are detected.. If the resources are not available, the replay request is placed in queue to wait for the resources to become available. When the resources become available, a replay string or strings (dedicated or shared) are initialized. For the shared logical string, one of each type of connection (mirrored and tailored) is established. **Tailored connections is a Release B**

**capability.** [24] The following replay control features will be exercised: play, pause, step, stop, reset, and time change (begin time and step interval).

### **EOC4.3 Standing Orders**

**Standing Orders are a Release B capability.** []

Requirements to be Verified:

**Release B:** EOC-6100#B, EOC-6195#B, EOC-6200#B

This test verifies that the EOC can create and execute standing orders that perform repetitive R/T and historical telemetry analyses automatically.

Two types of standing orders will be generated: Report Standing Orders using the report (custom, periodic, and on-demand) template builders and Analysis Standing Orders using the Analysis Request Builder. A Standing Order Browser tool is used to view, enable, disable, delete, and modify all the standing orders in system; it also provides the status of a standing order.

### **EOC4.4 Analysis Requests and User-Defined Statistics Generation**

**Analysis request monitoring, analysis report and product generation (with the exception of output datasets) are Release B capabilities.** [24]

Requirements to be Verified:

**Release A:** EOC-6050#A, EOC-6060#A, EOC-6070#A, EOC-6100#A,  
EOC-6195#A

**Release B:** EOC-6050#B, EOC-6060#B, EOC-6070#B, EOC-6100#B,  
EOC-6110#B (b, c, d, e), EOC-6195#B, EOC-6200#B

This test verifies that the EOC can create and fulfill telemetry analysis requests, generate user-defined statistics, and apply pre-defined algorithms to received telemetry. **This algorithm feature is a Release B capability.** [24]

- Analysis requests are submitted through the Analysis Request Builder for a selected set of historical telemetry data. The analysis requests specify the request processing site (local only or EOC only); data quality (all data, good data only); telemetry parameters; time periods; sampling rate (all data, changes only data, and data every Nth sample up to 32767); user-defined statistics; and/or algorithms required to generate analysis products. All sampling rates are exercised for various combinations of good and bad data. Each type of analysis product output view (telemetry attributes, graph, and table) is exercised. The format option is used to customize each type of output view. The remaining product options (output dataset, input dataset, and carry-out file) are also exercised. **Plotting data contained within a dataset and the**

creation of reports that contain plots and tables are Release B capabilities.

- User-defined statistics (min-max-mean and standard deviation) for a specified time interval (between one second and 24 hours) are generated for a selected set of telemetry parameters. The resulting statistical datasets are archived and are retrieved for display via the FUI and/or report generation.

#### EOC4.5 System Statistics and Dataset Generation

Requirements to be Verified:

**Release B:** EOC-6050#B, EOC-6195#B, EOC-6200#B

This test verifies that the EOC can generate system statistics and store them as datasets for display by the FOS User Interface (FUI).

- System statistics (analog, discrete, and limit) are automatically generated at the EOC for telemetry parameters on daily, monthly, orbital, and mission-to-date time spans. Statistical datasets are generated and archived. **This is a Release B capability. [24]**
- Historical requests for selected archived statistics are submitted; these requests include request name, time interval (start/stop), and the telemetry parameter names. The selected archived statistics are chosen to ensure that the capability of crossing operational database boundaries is exercised.

#### EOC4.6 SSR Analysis

**This is a Release B capability. [24]**

Requirements to be Verified:

**Release B:** EOC-5030#B (a, b), EOC-6010#B, EOC-6110#B (b, c, d, e), EOC-6195#B, EOC-6210#B

This test verifies that the EOC can detect and isolate faults in Solid-State Recorder (SSR) playbacks, and take corrective measures by generating command requests and/or recommending other courses of action.

Faults in the Solid-State Recorder (SSR) playbacks are detected and isolated. The SSR H/K telemetry, EDOS SSR CODA, and the NCC link status are evaluated to ensure the receipt of SSR data. Loss of data information is provided via the CODA. Loss of signal information is provided via the Network Control Center (NCC) ODM. **EDOS CODAs and NCC ground telemetry are not handled until Release B. [24]** The SSR buffer pointers, buffer status, and playback state is monitored using the SSR Analysis tool. This tool also displays SSR parameters, and recording and playback counters in table and graph format. Data loss recovery and RF link problems and solutions, and command requests for playbacks are viewed via the scrolling list in the SSR Analysis window. A report of

the state of the SSR at the end of a contact will be forwarded to the PAS and FUI for display.

#### **EOC4.7 S/C Clock Correlation Analysis**

**This is a Release B capability. [24]**

Requirements to be Verified:

**Release B:** EOC-5030#B (a, b), EOC-5187#B, EOC-6210#B

This test verifies that the EOC can calculate discrepancies between the S/C Clock and Coordinated Universal Time (UTC), and generate discrepancy reports and corrective commands requests to adjust the S/C Clock.

The S/C clock drift error is calculated using the Return Channel Time Delay (RCTD) method. The S/C clock drift error is then calculated using the User S/C Clock Calibration System (USCCS) method. The S/C clock time bias required for synchronizing the S/C clock relative to UTC is determined via both methods and corrective command requests are generated.

#### **EOC4.8 Transfer, Archival, and Retrieval of Analysis Results**

Requirements to be Verified:

**Release A:** EOC-7120#A

**Release B:** EOC-7120#B

This test verifies that the EOC can store and retrieve analysis results (carry-out files and other analysis products) from the local EOC archive (short-term storage) and the GSFC DAAC (long-term storage). This test also verifies that carry-out files can be forwarded to the S/C Analysis System (SAS) and other appropriate recipients.

- The carry-out files are generated by the FOS Analysis Subsystem (FAS). They contain the following types of data: AM-1 S/C housekeeping data, AM-1 S/C health and safety data, and AM-1 diagnostic data, Network Control Center (NCC) operator data message (ODM) data, and EDOS Customer Operations and Data Accounting (CODA) message data.
- Carry-out files and other analysis products are stored and received from the local EOC archive (short-term storage) and the GSFC DAAC (long-term storage).
- The SAS receives the carry-out files, SSR trash buffer files, and standard analysis products for specialized mission analyses that are not supported by the FOS Analysis Subsystem.
- A selected set of analysis products are provided via FUI displays and reports at the EOC. **Analysis report generation is a Release B capability. [24]**

**Follow-up on the following Release B capabilities: S/C Activity Log and Expert Advisor.**

Test procedures:

### Test Set-Up:

Step	Station	Action	Expected Results	Comments
1	EOC	<b>Initialize the FOS EOC hardware.</b> Refer to the FOS Operations Tool Manual for the ECS Project, Section 4.1.1, Hardware Initialization.	FOS EOC hardware: DEC RAID (no name), RAID Server (foseoc2), Data Server (foseoc7), Real-Time Server (foseoc6), and EOC User Stations (HP and Sun) are up and running. [24]	RAID contains the users' home directories and the operational FOS software in /fos, which needs to be mounted by the other machines. [24]
2	ETS (MPS)	Initialize the ETS MPS hardware.	ETS Hardware: MPS hardware is up and running.	<b>Release A:</b> This step is not required Release B: This step is required.
3	EDOS	Initialize the EDOS hardware.	The EDOS hardware is up and running.	<b>Release A:</b> This step is not required Release B: This step is required.
4	ETS (MPS)	Bring-up the MPS Graphical User Interface (GUI).	The MPS Menu Controller appears with MPS and OMDSIM buttons	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
		<b>Login to the ETS X-terminal (UNIX OS)</b> Type <code>ets_mps</code>	The MPS main window appears	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
5	ETS (MPS)	Select MPS	The MPS main window appears	<b>Release A:</b> This step is not required Release B: This step is required
6	ETS (MPS)	Bring-up the MPS software.	The following message is shown at the bottom of the PDOS terminal: <code>TY_main ... waiting for message</code>	ETIS PDOS terminal is <b>TBD</b> . <b>Release A:</b> This step is not required <b>Release B:</b> This step is required
		<b>Login to the ETS PDOS terminal</b> Change to the directory where the MPS startup script resides and type <code>RUNACPT</code> .	A MPS ready message is shown in the event log window of the MPS main window.	Release B: This step is required
7	ETS (MPS)	Select S/C simulation mode for MPS. Select the <b>Spacecraft radio button</b> for <b>Simulation Mode</b> from the MPS main window.	The Spacecraft radio button is sensitized.	<b>Release A:</b> This step is not required Release B: This step is required

Step	Station	Action	Expected Results	Comments
8	ETS (MPS)	Select the PDB as the data source for the telemetry being generated by the MPS.	The PDB radio button is sensitized.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
9	ETS (MPS)	Select the <b>PDB radio button</b> under <b>Data Source</b> from the MPS main window.	The <b>Spacecraft Time</b> and <b>UTC</b> displays on the MPS main window are updated.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
10	EDOS	Set the S/C and UTC times to the GMT time provided at the EOC.  Select <b>Set Time</b> from the <b>Control</b> pull-down menu in MPS main window and enter the GMT time values.	A message that states that the initialization of the EDOS software was successful is displayed.	Is the ETS MPS GUI software and LRS GUI and startup software installed on the same UNIX workstation?  ETS LRS terminal is TBD.
11	EOC	Initialize the EDOS software.		<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
12	EOC (Data Server)	Start the Sybase servers on the Data Server and Real-Time Server.  <b>Login to the FOS Data Server, “foseoc7”, Type cd /fos/test/am1/scripts/setup &lt;Return&gt; Type A2_DataServerStartup &lt;Return&gt;</b>	Sybase server #1 has started on Data Server, “foseoc7”. Sybase server #2 has started on Real-Time Server, “foseoc6”.	The appropriate FOS software processes are now running on the Data Server.
13	EOC (Real-Time)	Start up the FOS software for the Real-Time Server.	The appropriate FOS software processes are now running on the Real-Time Server.	

Step	Station	Action	Expected Results	Comments
	Server)	<b>Login to the FOS Real-Time Server, “foseoc6”</b> Type cd /fos/test/am1/scripts/setup <Return> Type A2_ <b>RealTimeServerStartup</b> <Return>		
14	EOC (User Station)	Start up the FOS software for the User Station, “TBD-7”.	The appropriate FOS software processes are now running on the EOC User Station.	
		<b>Login to the EOC User Station, “TBD-7”</b> Type cd /fos/test/am1/scripts/setup <Return> Type A2_ <b>UserStationStartup</b> <Return>	ECS Flight Operations login window is displayed.	
15	EOC (User Station)	Login into the ECS Flight Operation System. Enter <login name> <Return> Enter <password> <Return>	<b>Control Window</b> is displayed.	<b>login name is TBD-1.</b> <b>password is TBD-2.</b>
16	EOC (User Station)	Bring up the <b>Event Display Window</b> via the <b>Tools Button</b> on the <b>Control Window</b> .	The <b>Event Display Window</b> appears.	
17	EOC (User Station)	Enable telemetry data archiving. Archiving is automatically enabled via a database flag.	An event message stating that telemetry archiving is enabled. For <b>Release A</b> , no event message is expected.	<b>Release A:</b> Archiving is already enabled. <b>Release B:</b> The ECL directive ARCHIVE will control the archiving modes: ARCHIVE TLM =ENABLE <tlm TYPE>
18	~	Record the system configuration on the execution cover sheet.	The “As Run” Configuration details are recorded on the execution cover sheet.	

### Test Execution:

EOC4.1 Quick Analysis TBS		
Step	Station	Action
1		

### EOC4.2 Telemetry Replays TBS

EOC4.2 Telemetry Replays TBS		
Step	Station	Action
1		

### EOC4.3 Standing Orders TBS

EOC4.3 Standing Orders TBS		
Step	Station	Action
1		

### EOC4.4 Analysis Requests and User-Defined Statistics Generation

EOC4.4 Analysis Requests and User-Defined Statistics Generation		
Step	Station	Action
1	EOC (User Station)	Invoke the <b>Analysis Request Builder</b> tool.
2	EOC (User Station)	Enter <b>AR1</b> in the <b>Request Name</b> field.
3	~	Select a <b>pair time</b> for telemetry data to be extracted from the FOS DMS and used for analysis product generation.
4	EOC (User Station)	Click on the <b>Select Time</b> push button to invoke the <b>Pair Time Selector</b> tool.

Step	Station	Action	Expected Results	Comments
5	EOC (User Station)	Enter the <b>start date</b> for the historical telemetry data.  Type <b>1996/35x &lt;Return&gt;</b>	The new start date is accepted and displayed in the <b>.start_date</b> text field.	Date = <year>/<day of the year>  $x = [1-4]$ .
6	EOC (User Station)	Enter the <b>start time</b> for the historical telemetry data.  Type <b>HH:MM:SSS &lt;Return&gt;</b>	The new start time is accepted and displayed in the <b>.start_time</b> text field.	Time = <hrs><mins><secs>  (e.g., 17:44:32.000)
7	EOC (User Station)	Enter the <b>stop date</b> for the historical telemetry data.  Type <b>1996/35x &lt;Return&gt;</b>	The new stop date is accepted and displayed in the <b>.stop_date</b> text field.	Date = <year>/<day of the year>  $x = [1-4]$ .
8	EOC (User Station)	Enter the <b>stop time</b> for the historical telemetry data.  Type <b>HH:MM:SSS &lt;Return&gt;</b>	The new stop time is accepted and displayed in the <b>.stop_time</b> text field.	Time = <hrs><mins><secs>  (e.g., 17:44:32.000)
9		Accept pair time.	This pair time is now selected and displayed in the <b>Selected Times</b> table on the <b>Analysis Request Builder</b> screen.	
10	EOC (User Station)	Select additional pair times by following the instructions in Step 5-9  <b>Add pair times for .</b>	Click on the <b>OK</b> push button.	
11	~		Select a parameter with sampling and statistics rates.	
12	EOC (User Station)		Click on the <b>Select Telemetry</b> push button to invoke the <b>Analysis Telemetry Selector</b> tool.	<b>Analysis Telemetry Selector</b> screen appears.
13	~		Select a subsystem path.	
14	EOC (User Station)		Click on the <b>Filter</b> push button to invoke the <b>Selection Filter</b> tool.	<b>Selection Filter</b> screen appears.
15	EOC	Click on <b>AMI</b> in the left listbox.	The selected subsystem path (e.g., <b>AM1_GNC_1</b> )	<b>Sample Type: I</b> for Current, <b>V</b>

Step	Station	Action	Expected Results	Comments
	(User Station)	Select a < S/C subsystem or instrument> from the second listbox. Select a <Sample Type> from the third listbox. Click on the <b>Select</b> push button to select the specified subsystem path.	is now selected and displayed in the right most listbox labeled <b>Selected</b> .	for Voltage, <b>T</b> for Temperature, <b>B</b> for Bi-Level, <b>P</b> for Power, <b>S</b> for Configuration Information and <b>N</b> for Status Information and <b>N</b> for Numeric Counter Data.
16	EOC (User Station)	Select any additional subsystem paths by following the instructions in steps 14-15.		
17	EOC (User Station)	Click on the <b>OK</b> push button to accept the selected subsystem paths to be used in selecting parameters.	The selected subsystem paths are now displayed in the <b>Subsystems</b> listbox on the Analysis Telemetry Selector screen.	
18	EOC (User Station)	Click on <one of the selected subsystem paths>in the Subsystems listbox.	A list of available parameters for this subsystem path is displayed in the <b>Available Parameters</b> listbox.	
19	EOC (User Station)	Click on <one of the specified parameters - TBD> in the Available Parameters listbox.		
20	EOC (User Station)	Click on the <b>Changes Only</b> radio button inside the frame labeled <b>Sampling Rate</b> .		
21	EOC (User Station)	Enter in the integer 6 and click on the <b>Mins</b> (for minutes) in the pull down option menu inside the frame labeled <b>Statistics</b> ; click on the toggle button or hit <Return> to use this statistics rate.		
22	EOC (User Station)	Click on the <b>Select</b> push button to select parameter <one of the specified parameters - TBD> with sampling rate <b>Changes Only</b> and <b>statistics rate 6</b> minutes (or 360 seconds).	These values are now selected and displayed in the <b>Selected Parameters</b> table.	
23	EOC (User Station)	Repeat step 5 if necessary. Click on the push button labeled “OK” to accept the selected parameter(s) with sampling and statistics rates to be used in the analysis request. These are now displayed in the table labeled		

Step	Station	Action	Expected Results	Comments
24	EOC (User Station)	"Selected Telemetry" in the Analysis Request Enter <b>AR 1</b> in the <b>Output DataSet Name</b> field, and click on the toggle button for the results of this request to be written into this file.	An event message stating that the file named <b>AR_1.data</b> was successfully created is displayed in the <b>Event Display Window</b> .	
25	EOC (User Station)	Save this request by selecting <b>Save As</b> from the <b>File</b> pull-down menu located on the top menu bar.	An event message stating that the analysis request named <b>ARI</b> was successfully saved is displayed in the <b>Event Display Window</b> .	
26	EOC (User Station)	Click on the <b>OK</b> push button to submit this request.	An event message stating that an analysis request named <b>ARI</b> was successfully submitted is displayed in the <b>Event Display Window</b> .	
27	EOC (User Station)	,Access the Sybase repository directly to view and monitor the analysis request queue entries.  Log into the Sybase server by entering (from the system prompt): <b>isql -Ufos_dba -Pfos_dba</b>  When in Sybase, enter: > <b>use am1_fos_ops</b> > <b>go</b>  Select all entries in the request queue: > <b>select * from fos_request_queue</b> > <b>go</b>	The Analysis Request Builder screen closes.  All entries in the queue are sent to the screen. The following information is displayed:  <b>requestid</b> Specific ID of the analysis request <b>status</b> 0 = Pending, 1 = Active <b>requesttime</b> EOC time that the request was submitted (J2000) <b>stoptime</b> Stop time of analysis request period (spacecraft J2000) <b>stoptime</b> Stop time of analysis request period (spacecraft J2000) <b>username</b> ID of user who submitted the request	<b>Release A:</b> The user accesses the Sybase repository directly to view and monitor the queue entries, <b>Release B:</b> The Analysis monitoring capability will not be complete until Release B

#### EOC4.5 System Statistics and Dataset Generation TBS

Step	Station	Action	Expected Results	Comments
1				

**EOC4.6 SSR Analysis TBS**

Step	Station	Action	Expected Results	Comments
1				

**EOC4.7 S/C Clock Correlation Analysis TBS**

Step	Station	Action	Expected Results	Comments
1				

**EOC4.8 Transfer, Archival, and Retrieval of Analysis Results**

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Change to the directory on the EOC server where the analysis requests reside. <b>cd /fos/test/am1/fui/requests</b>	The current working directory is <b>/fos/test/am1/fui/requests.</b>	
2	EOC (User Station)	Verify that the analysis datasets, statistics, metadata files reside in that directory. <b>ls -la</b>	The following files are in the directory listing: <b>&lt;analysis request name&gt;.request &lt;analysis request name&gt;.request</b>	
3	EOC (User Station)	Change to the directory on the EOC server where the analysis datasets reside for EOC request site processing. <b>cd /fos/test/am1/datasets</b>	The current working directory is <b>/fos/test/am1/datasets.</b>	
4	EOC (User Station)	Verify that the analysis datasets, statistics, metadata files reside in that directory. <b>ls -la</b>	The following files are in the directory listing: <b>&lt;dataset name&gt;.data</b>	

Step	Station	Action	Expected Results	Comments
5	EOC (User Station)	Change to the directory on the workstation where the analysis datasets reside for local request site processing.	<dataset name>.metadata <dataset name>.stats.data <dataset name>.stats.metadata	The current working directory is \$HOME/fos/test/am1/datasets.
6	EOC (User Station)	Verify that the analysis datasets, statistics, metadata files reside in that directory.  cd \$HOME/fos/test/am1/datasets pwd  ls -la	Verify that the analysis datasets, statistics, metadata files reside in that directory listing: <dataset name>.data <dataset name>.metadata <dataset name>.stats.data <dataset name>.stats.metadata	The following files are in the directory listing:

### Test Termination:

Step	Station	Action	Expected Results	Comments
1	EOC	Gracefully close out all FUI Windows except for the Control Window.	All FUI windows with the exception of the Control window have disappeared.	
2	EOC	Select <b>Quit</b> from the <b>File</b> menu or Select the <b>Close</b> button on the dialog	The Control Window has disappeared.	

Step	Station	Action	Expected Results	Comments
3		Type <b>BYE</b> on the command input line < <b>Return</b> > Change to the directory where the FOS shutdown script resides and generate a file listing.	ECS Flight Operation login window is displayed The file named "MyKill" is shown in the file listing.	
4	EOC	Type <b>cd /fos/test/am1/scripts/setup ls</b>  Type <b>ls</b> Execute the FOS shutdown script.	FOS applications are shutdown.	
5	EOC	Type <b>MyKill</b>  Check to see if all the FOS processes have been killed	All process information (including the process ID number) for any FOS processes still running is displayed.	
6	EOC	On Sun: Type <b>ps -ax   grep fos</b>  On a DEC: Type <b>ps -e   grep fos</b>  If some FOS processes are still running, kill the remaining FOS processes.	All FOS application processes are killed.	
7	EOC	Type <b>kill -9 &lt;processid&gt;</b> for each process still running.  On Sun: Type <b>ps -ax   grep fos</b>  On a DEC: Type <b>ps -e   grep fos</b>  Log off the EOC UNIX workstation(s).	UNIX login session ends.	
8	ETS (MPS)	Execute the MPS shutdown script.  Change to the directory where the MPS shutdown script resides and type <b>CLEAR</b> at the PDOS	All the MPS task processes are killed- they no longer appear in the task process listing.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required

Step	Station	Action	Expected Results	Comments
9	ETS (MPS)	terminal prompt; then type <b>lt</b> at the same prompt. Exit the MPS main window.	The MPS main window disappears.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
10	ETS (MPS)	Logout of the ETS X-terminal used for the MPS GUI.	UNIX login session ends.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
11	EDOS	Terminate all EDOS software processes associated with the test session.	All the EDOS software processes are killed-- they no longer appear in the process list.	<b>Release A:</b> This step is not required <b>Release B:</b> This step is required
12	FOS, ETS, EDOS	Shutdown hardware.	All the FOS, ETS, and EDOS hardware is shutdown and powered off.	

## Appendix: Test Package Requirements Summary

Note: These testcases address either Release A, Release B, or both the Release A and B requirements to which they are mapped. Refer to each individual testcase section for requirement mapping specifics.

Requirement	Description	Testcase(s)
EOC-5030#B - a, b	The EOC shall provide the capability to receive and process, non-telemetry data, which includes at a minimum the following: a. Messages from the NCC b. Telemetry processing status messages from EDOS	EOC4.6, EOC4.7
EOC-5187#B	The EOC shall have the capability to determine the spacecraft clock time bias required for synchronizing the spacecraft clock relative to Coordinated Universal Time (UTC).	EOC4.7
EOC-5240#B	The EOC shall be able to process history and archived spacecraft recorder data at rates up to 150 kbps.	EOC4.2
EOC-6010#A		EOC4.1
EOC-6010#B	The EOC shall provide the capability to perform analysis on real-time telemetry data and spacecraft recorder housekeeping data, and data from the EOC history log.	EOC4.1, EOC4.2, EOC4.6
EOC-6050#A	The EOC shall provide the capability to determine, for specified parameters over a specified time interval, at a minimum the following: a. Minimum value b. Maximum value c. Mean value d. Standard deviation of the parameter e. Time and duration of limit violations	EOC4.4, EOC4.5 (#B only)
EOC-6050#B		EOC4.4
EOC-6060#A	The EOC shall provide the capability to plot a specified parameter against another parameter or against time.	EOC4.4
EOC-6060#B		EOC4.1 (#B only), EOC4.4
EOC-6070#A	The EOC shall provide the capability to time-correlate related spacecraft parameters.	EOC4.2 (#B only), EOC4.3 (#B only), EOC4.4
EOC-6070#B		EOC4.4, EOC4.6
EOC-6100#A	The EOC shall provide the capability to perform trend analysis on spacecraft and instrument housekeeping parameters.	
EOC-6100#B	The EOC shall provide the capability to monitor and evaluate the spacecraft functions, resources, and performance, including at a minimum the following: a. Stored command processing b. Spacecraft recorders c. Safe mode processes d. Electrical power subsystem e. Propulsion subsystem	
EOC-6130#B	The EOC shall monitor the configuration of the spacecraft and instruments.	EOC4.1
EOC-6135#B	The EOC shall have the capability to recommend spacecraft reconfigurations.	EOC4.1
EOC-6140#B	The EOC shall provide the capability to maintain a record of the spacecraft and instrument configuration, including the state of all spacecraft subsystems and instruments.	EOC4.1

Requirement	Description	Testcase(s)
EOC-6195#A	The EOC shall provide the capability to detect, isolate, and report failures and anomalies at the spacecraft subsystem level, and the spacecraft level.	EOC4.1 (#B only), EOC4.3 (#B only), EOC4.4, EOC4.5 (#B only), EOC4.6 (#B only)
EOC-6195#B	The EOC shall detect, isolate, and participate in the resolution of failures and anomalies involving the spacecraft and instruments, communications with the spacecraft, and ground operations support of the spacecraft.	EOC4.1, EOC4.3, EOC4.4, EOC4.5
EOC-6200#B	The EOC shall be capable of providing recommended courses of actions for selected contingency situations.	EOC4.1, EOC4.6, EOC4.7
EOC-6210#B	The EOC shall be capable of extracting data sets from the history log by specifying time and data type to include as a minimum: telemetry, command, non-telemetry messages, operator directives, events, or limits violations.	EOC4.1, EOC4.7
EOC-7120#A		EOC4.2 (#B only), EOC4.8
EOC-7120#B		